

WHAT IS CLAIMED IS:

1. A force sensing element comprising:

a gauge portion which is formed of an n-type
5 semiconductor substrate whose (100)-face serves as a main
face, a p-type semiconductor substrate whose (110)-face
serves as a main face, or a p-type semiconductor
substrate whose (111)-face serves as a main face and
which is pressed in a thickness direction of the
10 semiconductor substrate upon receiving a force; and

a plurality of electrodes which are
electrically connected to the gauge portion such that a
current path extending in a direction corresponding to
the thickness direction of the semiconductor substrate is
15 formed in the gauge portion.

2. The force sensing element according to claim 1,
wherein

the current path is so confined as to be formed
20 in a certain part of the gauge portion.

3. A force sensing element comprising:

a semiconductor substrate;
a gauge portion which is formed on one main
25 face of the semiconductor substrate and which is pressed
upon receiving a force; and

a plurality of electrodes which are
electrically connected to the gauge portion such that a
current path extending in a direction corresponding to a
30 thickness direction of the semiconductor substrate is
formed in the gauge portion,

wherein a force is applied along the current
path in the gauge portion.

4. The force sensing element according to claim 3,
wherein

a center of a region receiving a force of the
gauge portion is located at a center of a region to which
5 the force is applied.

5. The force sensing element according to claim 4,
wherein

10 the gauge portion is formed such that the
current path is formed in a crystal direction which
exhibits a high sensitivity for a transmitted force.

6. The force sensing element according to claim 3,
wherein

15 the gauge portion is formed such that the
current path is formed in a crystal direction which
exhibits a high sensitivity for a transmitted force.

7. The force sensing element according to claim 3,
20 wherein

the electrodes include a first electrode which
is electrically connected to the gauge portion and a
second electrode which is so formed on the other face of
the semiconductor substrate as to face the first
25 electrode.

8. A force sensing element comprising:

a semiconductor substrate;
a gauge portion which is formed on one main
30 face of the semiconductor substrate and which is pressed
upon receiving a force;

a plurality of electrodes which are
electrically connected to the gauge portion such that a
current path extending in a direction corresponding to a

thickness direction of the semiconductor substrate is formed in the gauge portion; and

a force transmission block which presses the gauge portion along the current path upon receiving a
5 force.

9. The force sensing element according to claim 8,
wherein

10 a center of a region receiving a force of the gauge portion is located at a center of a region to which a force transmitted from the force transmission block is applied.

15 10. The force sensing element according to claim 9,
further comprising:

a force transmission body support portion which is disposed symmetrically with respect to the gauge portion so as to support the force transmission block.

20 11. The force sensing element according to claim 9,
wherein

the gauge portion is formed such that the current path is formed in a crystal direction which exhibits a high sensitivity for a transmitted force.

25 12. The force sensing element according to claim 8,
wherein

the gauge portion is formed such that the current path is formed in a crystal direction which exhibits a high sensitivity for a transmitted force.
30

13. The force sensing element according to claim 8,
wherein

the electrodes include a first electrode which
35 is electrically connected to the gauge portion and a

second electrode which is so formed on the other face of the semiconductor substrate as to face the first electrode.

5

14. A force sensing element comprising:

a first semiconductor substrate;

a gauge portion which is formed on one main face of the first semiconductor substrate and which is pressed upon receiving a force;

10

a second semiconductor substrate which is joined on the side of one main face thereof to the gauge portion of the first semiconductor substrate;

a first electrode which is formed on the first semiconductor substrate; and

15

a second electrode which is formed on the second semiconductor substrate,

wherein a current path, which extends in the same direction as a force is applied to the gauge portion, is formed of the first electrode and the second electrode.

20

15. The force sensing element according to claim 14, wherein

the first electrode is formed on at least one of the other main face and a lateral face of the first semiconductor substrate, and

the second electrode is formed on at least one of the other main face and a lateral face of the second semiconductor substrate.